The pending claims are 1-32, 34-36, 43, and 47-50.

Rejections based on 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 10 and 11 under 35 U.S.C. § 112, second paragraph for indefiniteness. Applicants submit that the pending claims are definite.

The Examiner rejected claim 10 based on the phrase "foam is uniaxially or multi-axially oriented." The specification provides on page 20, lines 12-23 that uniaxially oriented foams are those that have been stretched in one direction and multi-axially oriented foams are those that have been stretched in more than one directions. Claim 10 has been amended to recite that the foams are stretched in at least one direction.

The Examiner alleges that the phrase "contains microvoids between or a separation of said matrix and said expandable microspheres" in claim 11 is incomprehensible. The specification discloses on page 20, line 27 to page 21, line 9 that the interfacial adhesion between the foam matrix and the expandable microspheres should be such to allow at least some debonding to occur around the microspheres upon stretching. Stretching of the foam samples can cause a reduction in density of the foam due to formation of microvoids between the foam matrix and the microspheres. The microvoids can remain after the stretching process or they can disappear (i.e., collapse but the interface between the microsphere and the foam matrix remains unbonded). The claim has been amended to recite that the article contains microvoids between the matrix and said expandable microspheres.

Applicants respectfully request withdrawal of the rejections of claims 10 and 11 based on indefiniteness.

Rejections based on 35 U.S.C. § 103(a) over U.S. Patent No. 4,855,170

The Examiner rejected claims 1-3, 6-9, 12, 17-18, 20-30, 33, and 35-37 as obvious over U.S. Patent No. 4,855,170 (hereinafter "US '170") issued to Darvell et al. Applicants submit that the pending claims are not obvious over US '170.

US '170 provides tape products obtained by applying a layer of a pressure sensitive adhesive containing hollow thermoplastic microspheres to a sheet backing. The pressure sensitive adhesive composition containing the microspheres is syrupy when applied to the sheet backing. That is, the microspheres are added to the adhesive composition prior to polymerization. When the composition is coated onto the sheet backing, the microspheres tend to migrate to the exposed surface of the coating layer. The resulting coating layer has an upper surface with an irregular contour. As shown in Examples 25 to 27, varying the amount of microspheres included in the adhesive coating can change the adhesion of the coating. The adhesion decreases as the roughness increases. Adhesive coatings having a rough surface can be repositioned.

In contrast to US '170, the articles of the present invention have a homogeneous distribution of microspheres throughout the foam. The articles are prepared by extruding a polymeric melt rather than coating a viscous syrup. The microspheres are added to the melted polymeric material to form an extrudable composition. The microspheres are uniformly distributed throughout the extrudable composition and the viscosity of the extrudable composition is sufficiently high that the microspheres undergo minimum migration during the extrusion process. The microspheres are not concentrated near the upper surface of the foam as disclosed in US '170.

US '170 does not disclose a homogeneous distribution of polymeric microspheres throughout a foam. US '170 does not disclose a homogenous distribution of polymeric microspheres through a foam in combination with a smooth surface. There is no suggestion or motivation for providing such a foam article based on the teaching of US '170 because such an article could not be repositioned easily.

The Examiner cited JP 09328662 A as evidence of the state of the art. The Examiner stated that this reference discloses a pressure sensitive adhesive transfer tape having a release paper with a surface roughness less than or equal to 20 microns. Applicants note that even though the release paper may have a surface roughness less than or equal to 20 microns, a coating applied to the release paper does not inherently have the same surface roughness. For example, the microspheres in a viscous syrupy coating composition, as disclosed in US '170, could migrate to the surface of the coating resulting in a surface roughness greater than 20 microns.

Claim 1 is not obvious based on US '170. For at least the same reasons, dependent claims 2-3, 6-9, 12, 17-18, and 20-22 are not obvious. Applicants respectfully request withdrawal of the rejection of these claims as obvious over US '170.

Additionally, US '170 provides no teaching or suggestion that the foam has a uniform size distribution of microspheres from the major surface to the center of said foam (claim 2). The microspheres tend to migrate towards the surface in the coating compositions used in US '170 because the coatings are viscous syrups. The hollow microspheres having a lower density than the polymeric matrix surrounding the microspheres are typically most concentrated on the upper surface of the foamed article.

Independent claim 23 provides a polymer foam that has a machine (or longitudinal) direction and crossweb (or transverse) direction standard deviation of density or thickness over average density or thickness of less than about 0.2. The polymer foam includes a plurality of thermoplastic expandable polymeric microspheres.

US '170 discloses the use of expandable polymeric microspheres in Example 3. The microspheres are expanded after coating the adhesive composition onto a web. No pressure is applied to constrain the dimensions of the foam. In contrast, the expandable microspheres in the present invention are typically expanded within a die as part of an extrusion process. The shape of the exit opening of the die dictates the shape of the foam. The resulting extruded foam can be produced to within tighter density and thickness tolerances than the articles prepared using the coating methods disclosed in US '170. p-b-p.

Preparing foams with the claimed tolerances is not obvious from the methods taught in US '170. The articles in US '170 do not inherently have such density or thickness tolerances. US '170 provides no suggestion or motivation for preparing articles having such density or thickness tolerances.

Claim 23 is not obvious based on the disclosure of US '170. The dependent claims 24-30, 33, and 35-37 are not obvious over this reference for at least the same reasons.

Applicants respectfully request withdrawal of the rejection of claims 23-30, 33, and 35-37 based on US '170.

Rejections based on U.S.C. § 103(a) over U.S. Patent No. 4,855,170 individually or in view of U.S. Patent No. 3,864,181

The Examiner rejected claim 4 as obvious over US '170 individually or in view of U.S. Patent No. 3,864,181 (hereinafter "US '181") issued to Wolinski et al.

Claim 4 is dependent on claim 1. As such, claim 4 is not obvious over US '170 as discussed above.

US '181 does not remove the deficiencies noted above with US '170. Although US '181 discloses articles having an embossed pattern, the articles are not polymer foams containing a homogeneous distribution of polymeric microspheres. Rather, unexpanded polymeric microspheres are formulated into liquid coating solutions, coated on a substrate, and subsequently heated to expand. The compositions are not extruded as in the present invention but are coated as in US '170. As discussed above for US '170, the microspheres can migrate in the coating prior to drying and curing such that the microspheres are not uniformly distributed in the coating. If the microspheres have a higher density than the rest of the coating composition, they will tend to be concentrated at the lower surface of the coating. If the microspheres have a lower density than the rest of the coating composition, they will tend to be concentrated at the upper surface of the coating. The articles are not polymer foams containing a homogeneous distribution of polymeric microspheres.

The combination of US '170 and US '181 does not teach or suggest a homogeneous distribution of polymeric microspheres throughout a polymer foam. The combination does not disclose a homogenous distribution of polymeric microspheres throughout a polymer foam having a smooth surface.

Applicants respectfully request withdrawal of the obviousness rejection based on US '170 or the combination of US '170 with US '181.

Rejections based on U.S.C. § 103(a) over U.S. Patent No. 4,855,170 individually or in view of U.S. Patent No. 5,650,215

The Examiner rejected claim 5 as obvious over US '170 individually or in view of U.S. Patent No. 5,650,215 (hereinafter "US '215") issued to Mazurek et al. Applicants submit that the pending claims are not obvious.

Claim 5 is dependent on claim 1. As such, claim 5 is not obvious over US '170 as discussed above.

US '215 does not remove the deficiencies noted above with US '170. Although US '215 discloses adhesive coated articles having microstructured surfaces, the adhesives are not foams containing microspheres.

The Examiner noted that Example 14 refers to a heat resistant foam. Heat resistant foam was used to cushion the silicon molding tool from two metal plates. The adhesive layer, however, was not a foam.

The combination of US '170 and US '215 does not teach or suggest a homogeneous distribution of polymeric microspheres throughout a polymer foam. The combination does not disclose a homogenous distribution of polymeric microspheres throughout a polymer foam having a smooth surface.

Applicants respectfully request withdrawal of the obviousness rejection based on US '170 or the combination of US '170 with US '215.

Rejections based on U.S.C. § 103(a) over U.S. Patent No. 4,855,170 individually or in view of U.S. Patent No. 3,864,181

The Examiner rejected claims 31-32 and 34-36 under 35 U.S.C. § 103(a) as obvious over US '170 individually or in view of US '181. Applicants submit that the pending claims are not obvious.

Claims 31-32 and 34-36 are dependent on independent claim 23. As discussed above, claim 23 is not obvious over US '170. For at least the same reasons, dependent claims 31-32 and 34-36 are not obvious over US '170.

US '181 does not remove the deficiencies of US '170. The combination of US '170 and US '181 does not teach or suggest a homogeneous distribution of polymeric

microspheres throughout a polymer foam. The combination does not disclose a homogenous distribution of polymeric microspheres throughout a polymer foam having a smooth surface.

Applicants respectfully request withdrawal of the rejections based on US '170 and the combination of US '170 with US '181.

Rejection based on 35 U.S.C. § 103(a) over U.S. Patent No. 4,855,170 individually or in view of U.S. Patent No. 4,415,615

The Examiner rejected claims 13-16 based on 35 U.S.C. § 103(a) as obvious over US '170 or in view of U.S. Patent No. 4,415,615 (hereinafter "US '615") issued to Esmay et al. Applicants submit that the pending claims are not obvious.

Claims 13-16 depend on claim 1. For at least the reasons discussed above regarding claim 1, claims 13-16 are not obvious over US '170.

US '615 does not remove the deficiencies noted above. This reference discloses a cellular pressure adhesive but the adhesive does not contain polymeric microspheres. The cellular structure is formed by frothing a composition that is polymerizable, coating the froth onto a backing, and polymerizing to form a pressure sensitive adhesive having at least 15% voids.

The combination of US '170 and US '615 does not disclose a homogenous distribution of polymeric microspheres through a foam. That is, the combination does not disclose a homogeneous distribution of polymeric microspheres throughout a foam. The combination of references does not disclose a homogenous distribution of polymeric microspheres through a foam in combination with a smooth surface. There is no suggestion or motivation for providing such a foam article based on the teaching of US '170 because such an article could not be repositioned easily.

Applicants respectfully request withdrawal of the rejections of claims 13-16 as on US '170 and the combination of US '170 with US '615.

Rejection based on 35 U.S.C. § 103(a) over U.S. Patent No. 4,855,170 in view of U.S. Patent No. 5,024,880

The Examiner rejected claims 19 and 43-46 as obvious over US '170 in view of U.S. Patent No. 5,024,880 (hereinafter "US '880") issued to Veasely et al. Applicants submit that the pending claims are not obvious.

Claim 19 depends on claim 1. For at least the reasons discussed above regarding claim 1, claims 13-16 are not obvious over US '170. Applicants respectfully request withdrawal of the obviousness rejection based on claim 19.

US '880 provides that saturated hydrocarbon elastomers can phase separate when photopolymerized in adhesives with acrylic monomers. However, to coat the compositions onto a substrate, the saturated elastomers need to be soluble in the acrylate monomers. The present claims do not include polymers that are soluble in acrylate monomers.

Claim 19 provides a foam that includes a blend of two polymers. The polymers in the blend include a pressure sensitive adhesive and a polymer selected from the group consisting of unsaturated thermoplastic elastomers, acrylate monomer-insoluble saturated thermoplastic elastomers, an non-pressure sensitive adhesive thermoplastic polymers. None of these are disclosed in US '880.

Applicants respectfully request withdrawal of the rejections based on the combination of US '170 and US '880.

Independent claim 43 provides a foam that is a polymer blend. The polymers in the blend include a pressure sensitive adhesive polymer and a polymer selected from the group consisting of unsaturated thermoplastic elastomers, acrylate monomer-insoluble saturated thermoplastic elastomers, acrylate-insoluble semicrystalline polymers, acrylate-insoluble amorphous polymers having a solubility parameter of less than 8 or greater than 11, elastomers containing ultraviolet radiation-activatable groups, and pressure sensitive and hot melt adhesives prepared from non-photopolymerizable monomers. None of these polymeric blends are taught by US '880 or US '170. These polymeric blends are not obvious over the combination of US '880 and US '170.

Applicants respectfully request withdrawal of the rejection based on claim 43.

The rejections based on claims 44-46 are moot because these claims have been cancelled from the application.

Applicants believe that the pending claims 1-32, 34-36, 43, and 47-50 are in condition for allowance. A Notice of Allowance is earnestly solicited.

Respectfully submitted,

Jean A. Lown

Jean A. Lown
Registration No. 48,428
Attorney for Applicants

JAL:jlh/53786US012 Amend to OA 7-31-02

Office of Intellectual Property Counsel
3M Innovative Properties Company
P.O. Box 33427
St. Paul, Minnesota 55133-3427
(651) 733-3169
Facsimile: (651) 736-3833

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Marked-up Version to Show Changes Made

In the claims:

Cancel claims 33, 37, 38-42, and 44-46 without prejudice or disclaimer.

10. (Once Amended) The foam article according to claim 1, wherein said polymer foam is [uni-axially or multi-axially oriented] stretched in at least one direction.

11. (Once Amended) The foam article according to claim 10, wherein said polymer foam has a matrix and contains microvoids between [or a separation of] said matrix and said expandable microspheres.

19. (Once Amended) The foam article according to claim 1, wherein said polymer foam comprises a matrix comprising a blend of two or more polymers wherein at least one of said polymers in said blend comprises a pressure sensitive adhesive polymer and at least one of said polymers is selected from the group consisting of unsaturated thermoplastic elastomers, acrylate monomer-insoluble saturated thermoplastic elastomers, and non-pressure sensitive adhesive thermoplastic polymers.

31. (Once Amended) The foam article according to claim 23 [A foam article comprising a polymer foam, said polymer foam comprising a plurality of thermoplastic expandable polymeric microspheres], wherein said polymer foam was made using polymers having a weight average molecular weight of at least about 10,000 g/mol.

34. (Once Amended) The foam article according to claim 23 [A foam article comprising a polymer foam, said polymer foam comprising a plurality of thermoplastic expandable polymeric microsphere], wherein said polymer foam was made using polymers having a shear viscosity, measured at a temperature of 175°C and a shear rate of 100 sec^{-1}, of at least about 30 Pascal-seconds (Pa-s).

43. (Once Amended) A foam article comprising a polymer foam that includes:

(a) a plurality of at least partially expanded expandable polymeric microspheres, and

(b) a polymer matrix comprising a blend of two or more polymers sufficiently free of urethane crosslinks and urea crosslinks to eliminate the need for isocyanates in said polymer matrix, wherein at least one of said polymers in said blend comprises a pressure sensitive adhesive polymer and at least one of said polymers is selected from the group consisting of unsaturated thermoplastic elastomers, acrylate monomer-insoluble saturated thermoplastic elastomers, acrylate-insoluble semicrystalline polymers, acrylate-insoluble amorphous polymers having a solubility parameter of less than 8 or greater than 11, elastomers containing ultraviolet radiation-activatable groups, and pressure sensitive and hot melt adhesives prepared from non-photopolymerizable monomers.

47. (New) The foam article according to claim 43, wherein the foam is capable of stretch activated release.

48. (New) The foam article according to claim 43, further comprising an adhesive layer attached to the polymer foam.

49. (New) The foam article according to claim 43, wherein said blend comprises the pressure sensitive adhesive and acrylate-insoluble semicrystalline polymers.

50. (New) The foam article according to claim 1, wherein said polymer foam comprises a matrix comprising a blend of two or more polymers wherein at least one of said polymers in said blend comprises a pressure sensitive adhesive polymer and at least one of said polymers is an acrylate-insoluble semicrystalline polymer.